DOCUMENT-IDENTIFIER: US 6298189 B1
TITLE: Radiation-curable optical glass fiber coating compositions, coated optical glass fibers, and optical glass fiber assemblies

DEPR:
This invention also provides a novel type of radiation-curable oligomer that can be used to adjust the fiber friction between the inner primary coating and the surface of the optical glass fiber. The radiation-curable oligomer comprises a glass coupling moiety, a slip agent moiety, and a radiation curable moiety, each moiety being linked to a single composite oligomer molecule through covalent bonding to provide a composite oligomer. Such linkage of all three moieties is heretofore unknown. Linkage of these moieties can be direct so that no intermediate linking group between the oligomer and the moiety is required. Alternatively, however, the linkage can be indirect by using intermediate linking groups.

DEPR:
The term "glass coupling moiety" can be readily understood by a person skilled in the art and is understood to mean a functional group which is known or has the ability to improve adhesion to an inorganic surface or at an inorganic-organic interface, and in particular, a glass surface or at a glass-polymer interface. Such glass coupling moieties are associated with conventional coupling agents or adhesion promoters, as known to those skilled in the art. These conventional coupling agents generally have (1) an organic functional group which bonds with, or is at least associated with, the organic material at the interface, and (2) an inorganic component which bonds, usually covalently, to the inorganic material at the interface. Although the complexities of such bonding are not fully understood, usually, bonding to the

inorganic surface occurs following hydrolysis and/or condensation reactions.

DEPR:
The radiation-curable moiety should help ensure that the composite oligomer is
covalently linked within a radiation-curable coating so that the composite
oligomer cannot be extracted or volatilized from the cured coating without
breaking covalent bonds.

DEPV:
(1) covalent bonding, for example from glass adhesion promoters;

DETL:
TABLE 10 Component (Amount is % by weight of total Ex. Ex. Ex. composition)
6-1 6-2 6-3 Oligomer H-(I-PTGL2000).sub.2 -I-H 36.1 42.3 36.1 Ethoxylated
Nonylphenol Acrylate 44.4 46.1 43.9 Phenoxyethyl Acrylate 5 5 5
2,4,6-trimethylbenzoyl Diphenyl 3 3 3 Phosphine Oxide and 2-Hydroxy-2-
Methyl-1-Phenyl-1-Propanone blend Thioethylene bis(3,5-di-tert-.8 .8 .8
butyl-4-Hydroxy) Hydrocinnamate y-Mercaptopropyltrimethoxy 1 1 1 Silane Rad
Wax 62EB (33 PE wax in 10 epoxy acrylate) Fluorosulfonamide Surfactant FC-
.1 .8 430 (3M) Fluoro A (Micronized PTFE) 2 10 Test results Clarity
(opaque?) yes yes yes Color white white white Viscosity, mPa.s at 25.degree.
5440 7960 7520 Film opacity, 3 mil opaque cloudy cloudy Fiber Friction
(g/min) 15.2 8.2 6.6 Crack propagation (mm) 1.96 2.2 Predicted Strip
Cleanliness 2.2 2.4 The oligomers were formed by reacting the following
components: H = Hydroxyethyl Acrylate I = Isophorone Diisocyanate PTGL2000 =
2000 molecular weight
polymethyltetrahydrofurfuryl/polytetrahydrofurfuryl
copolymer diol (Mitsui, NY) Perm = Permanol KM10-1733
polycarbonate/polyether
copolymer diol

CCOR:
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ORPL: